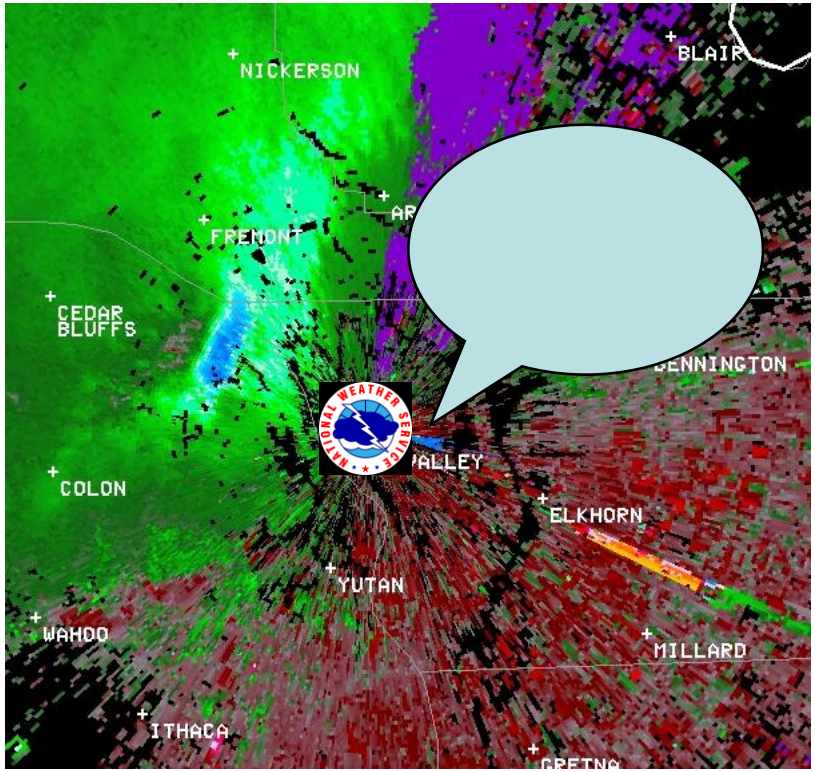
The 27 June 2008 Damaging Wind Event across Omaha, NE



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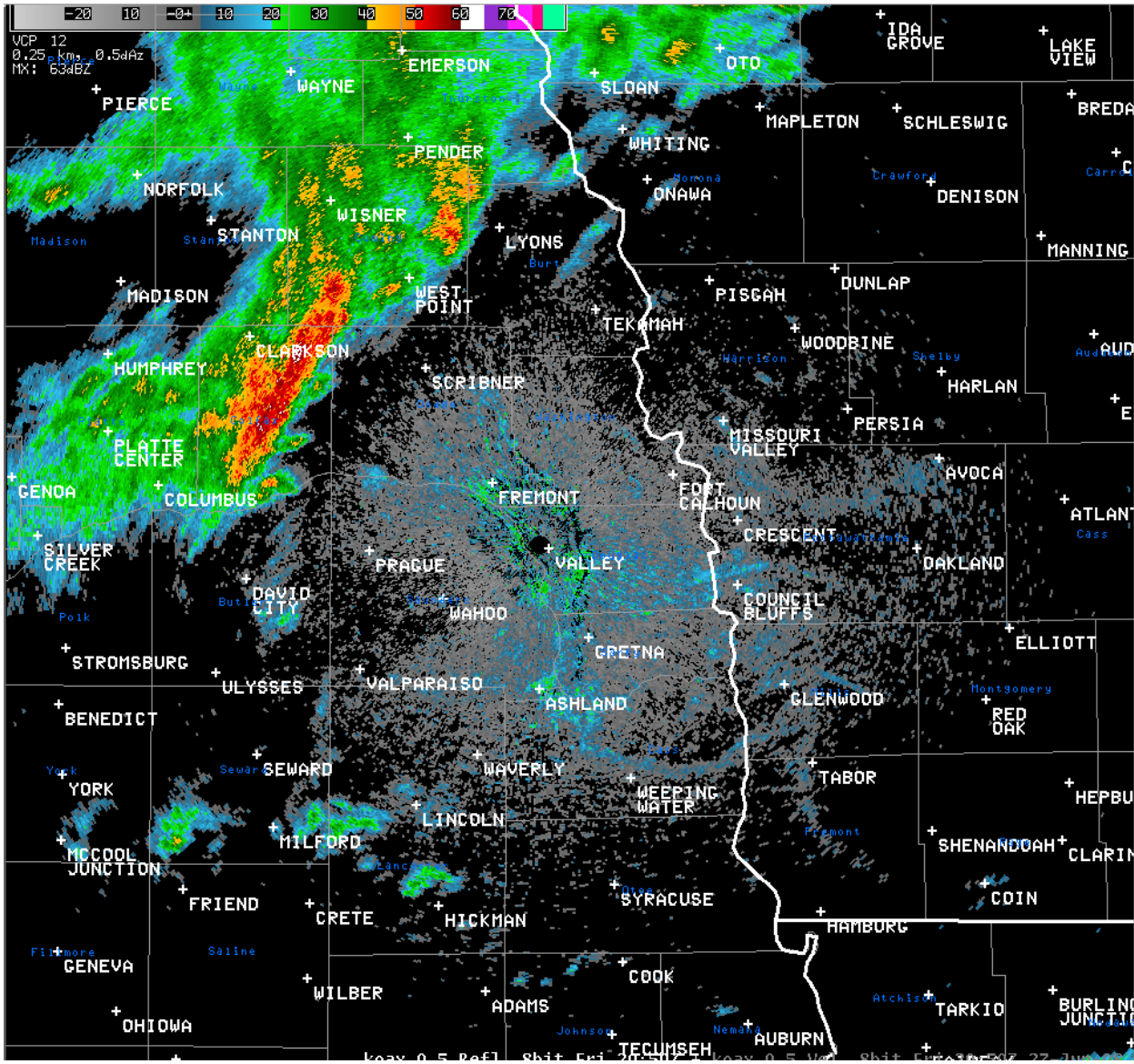
National Weather Service

Omaha/Valley, NE

12th Annual High Plains Conference
Hayes, KS
September 5, 2008

Presentation Outline

- Event Overview
- Synoptic Overview
- Mesoscale Features
- Radar Presentation
- Event Impacts
- Summary



KOAX Radar Loop to 2350 UTC

Event Impacts

Storm statistics:

•Path length: 90 miles

•Path width: 4 to 6 miles

•Estimated maximum wind speeds: 110-115 mph (EF2)

•One fatality (tree fell on car in Council Bluffs, IA) and several minor injuries

•Damage estimate: $53+ million in Douglas County (Omaha) alon

One of a series of storms to affect the Omaha metro area:

•5/24: Wind damage (power outages)

•6/4: Wind and hail

•6/8: Nocturnal QLCS tornado *

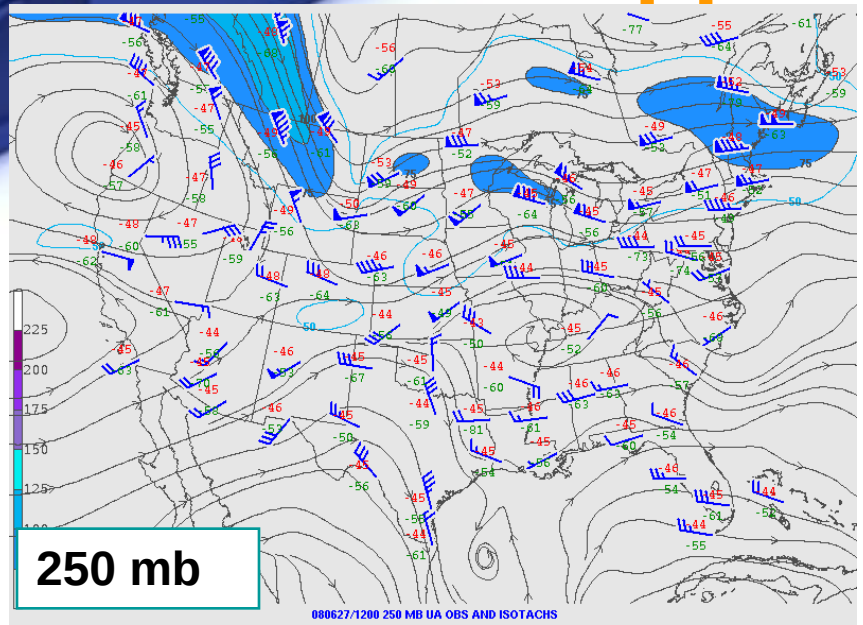
•6/10: Hail

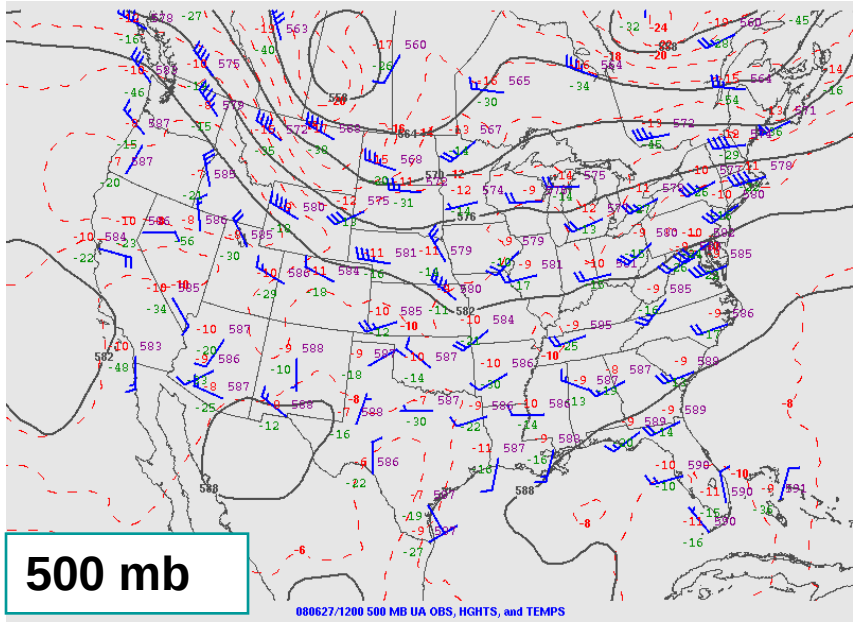
•6/11: Little Sioux Boy Scout Camp tornado (several victims from Omaha area); brief tornado NW of Omaha

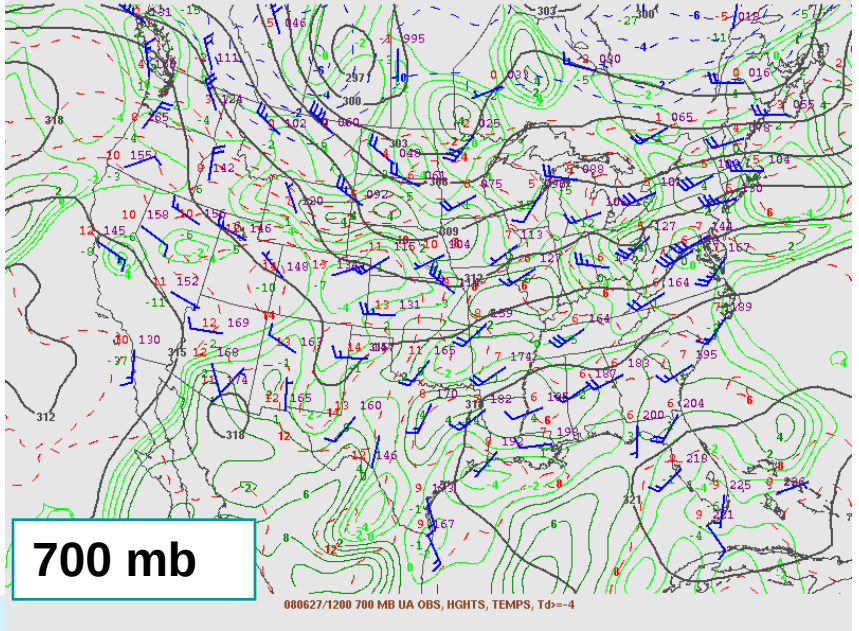
•6/15: Wind damage and hail

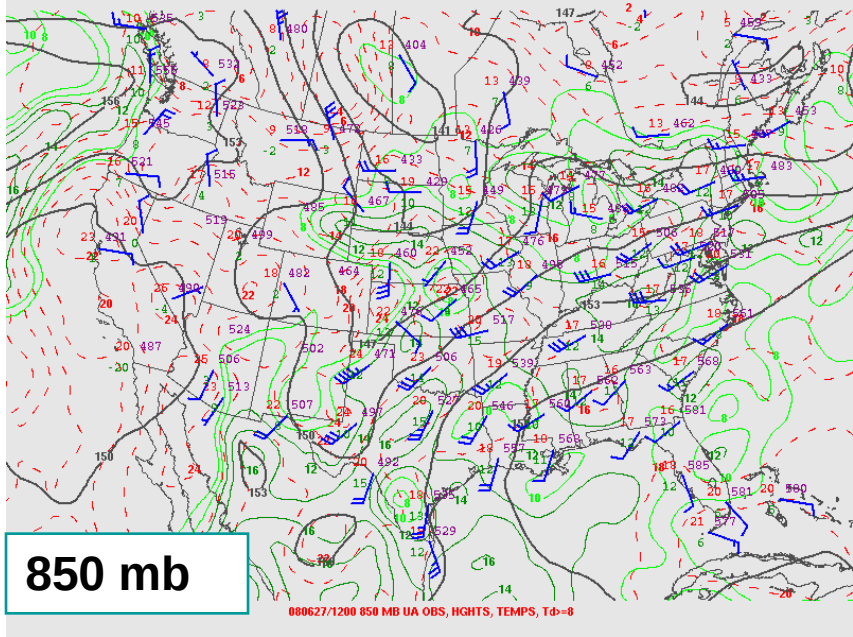
* Resulted in heightened awareness of siren policy, with sirens sounded on 6/27

1200 UTC Upper Air Observations



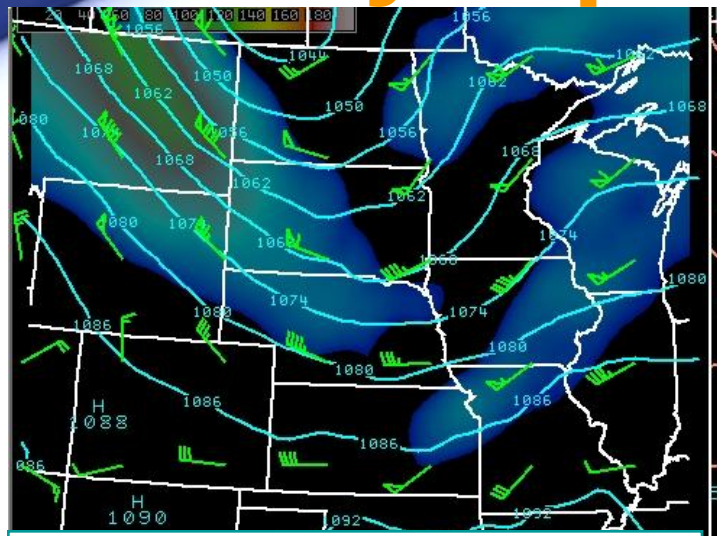




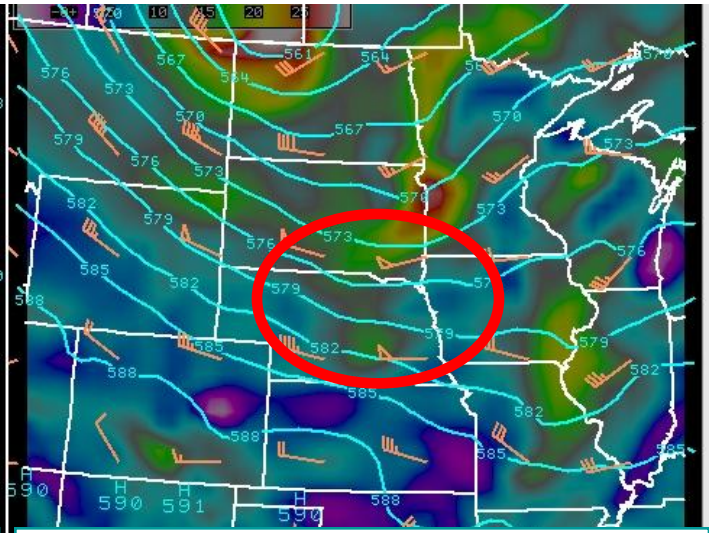


Synoptic Overview

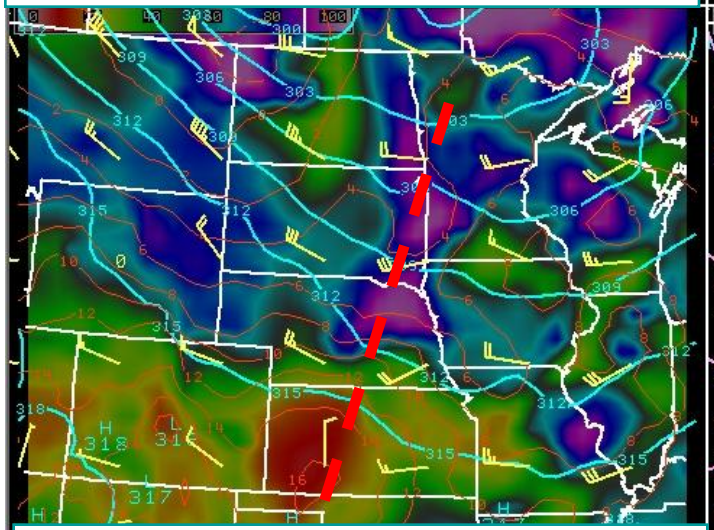
- RUC40 2000 UTC 27 June
- Note:
  - 500 mb jet
  - 700mb and 850 mb trough axes



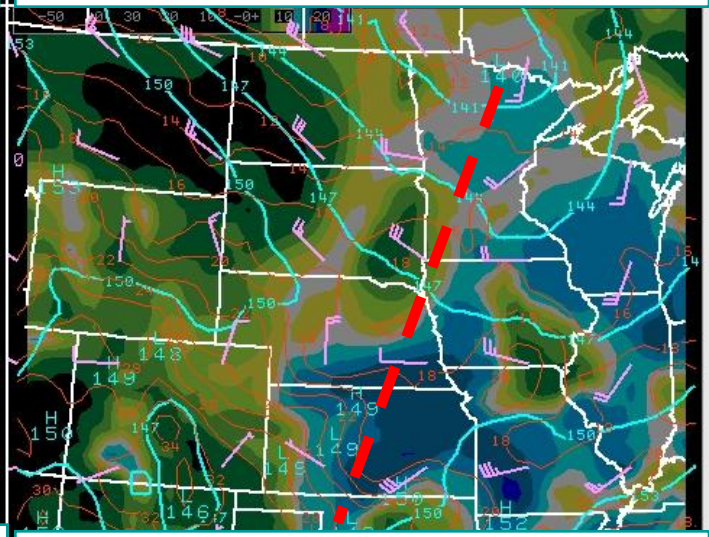
250 mb ht, wind, wind speed (shaded)



500 mb ht, wind, vorticity (shaded)



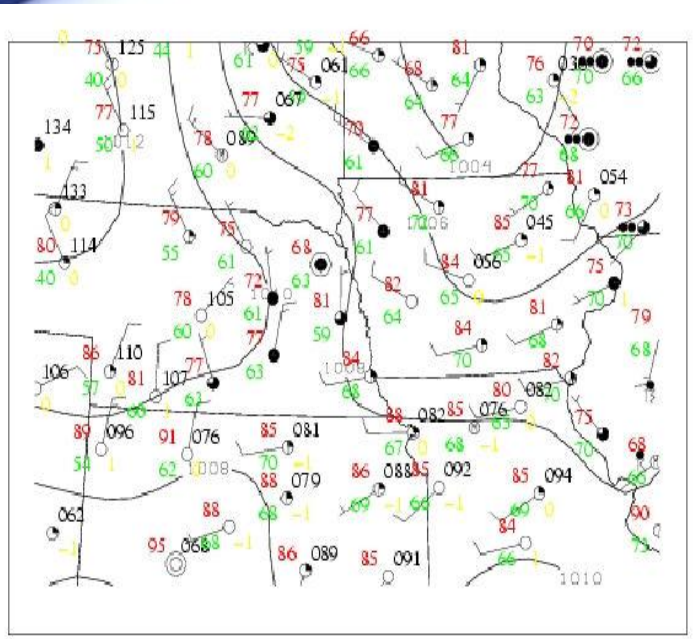
700 mb ht, wind, temperature, RH (shaded)

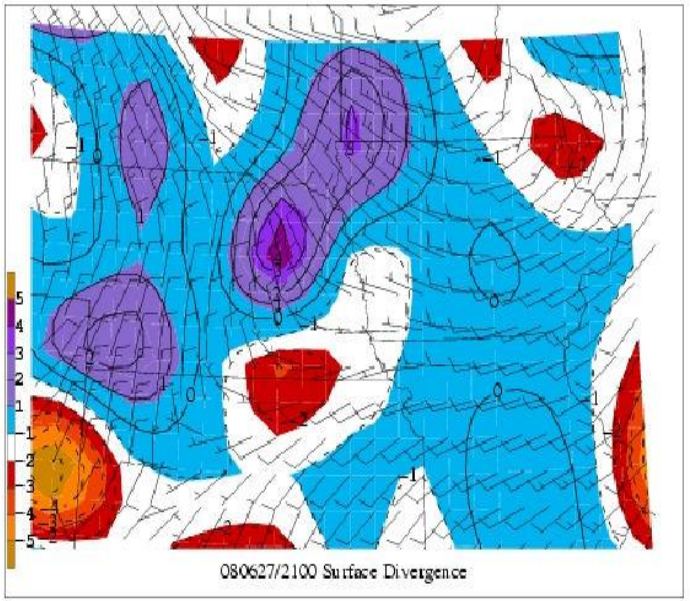


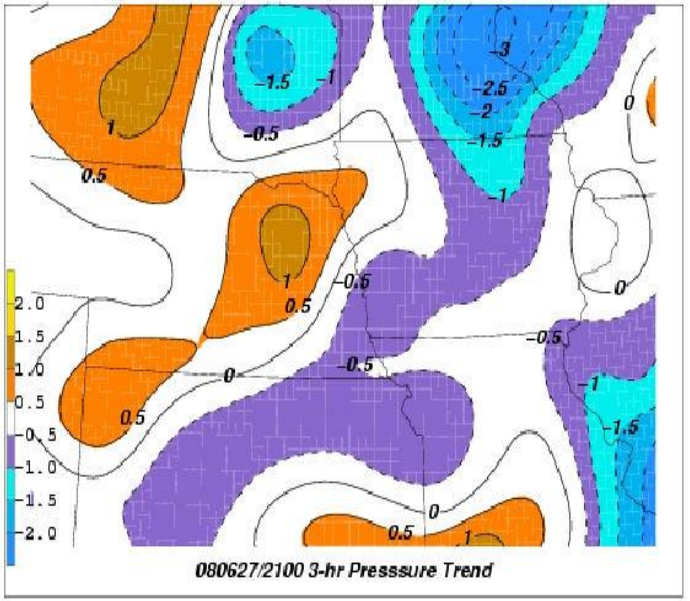
850 mb ht, wind, temperature, dewpoint (shaded)

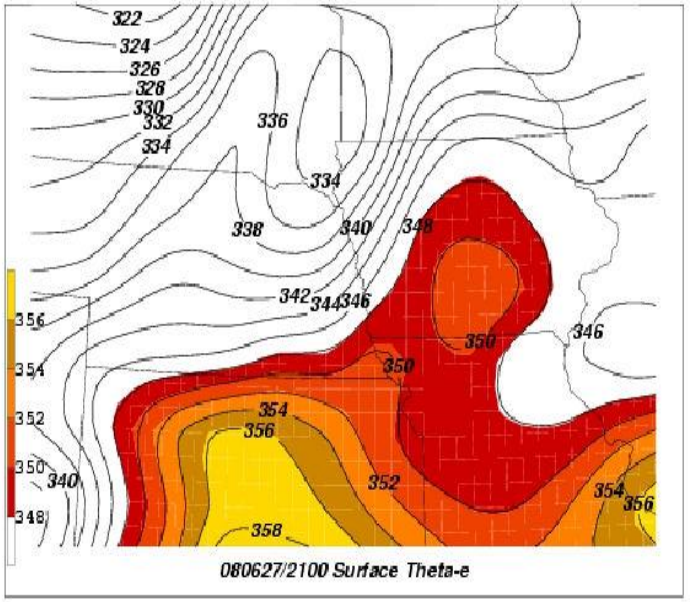
Surface Analysis

- 2100 UTC 27 June
- Note:
  - Several weak boundaries
  - Strong pressure rise and divergence behind storms
  - High theta-e ahead of storms



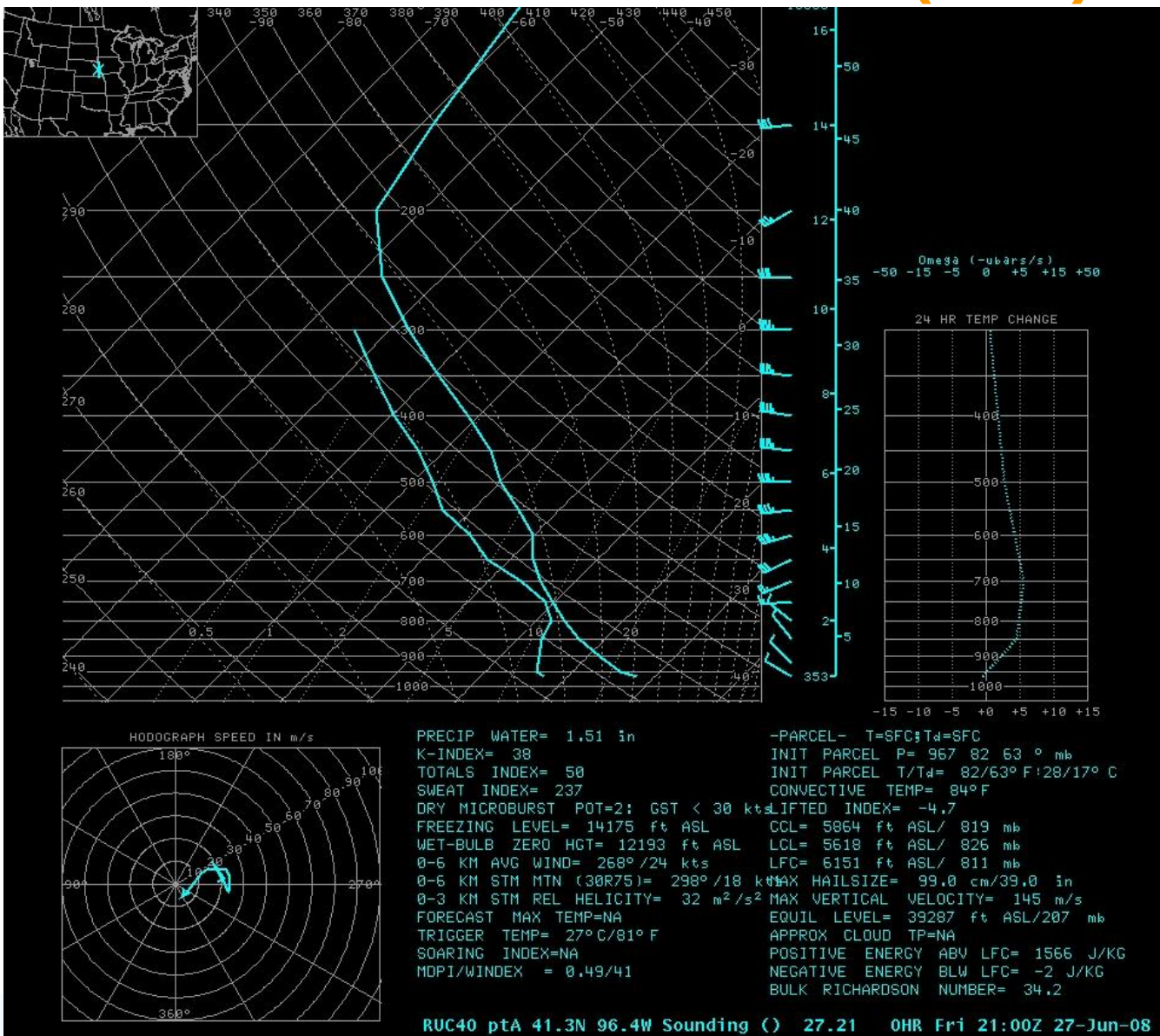






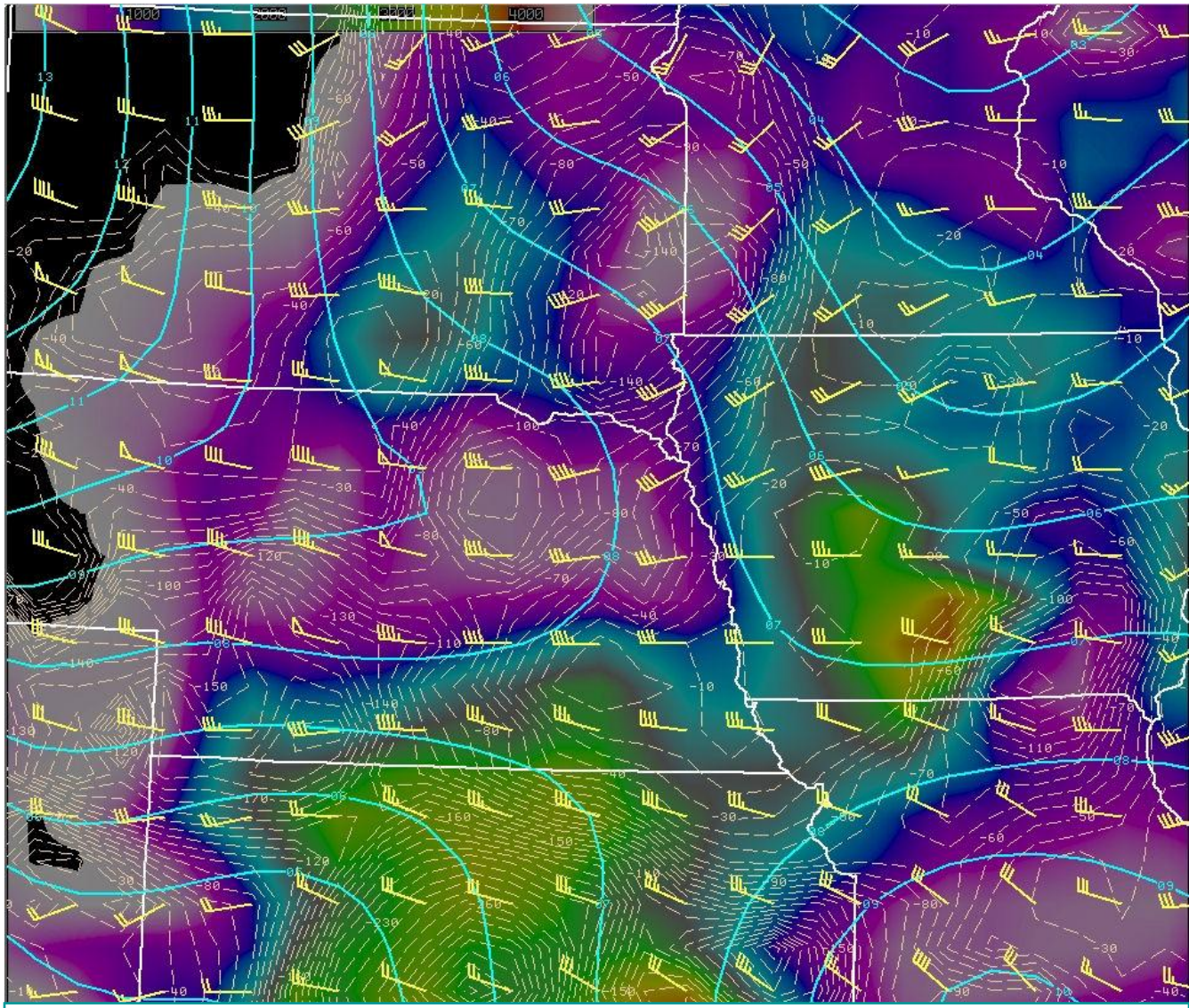
Point Sounding at KOAX:
2100 UTC 27 June (RUC)

- 1566 J/kg CAPE
- -2 J/kg CIN
- Dry below LCL
- Dry 700-500 mb
- 14175 ft freezing level
- Strong, unidirectional bulk shear (esp. above LCL)



Convective Environment

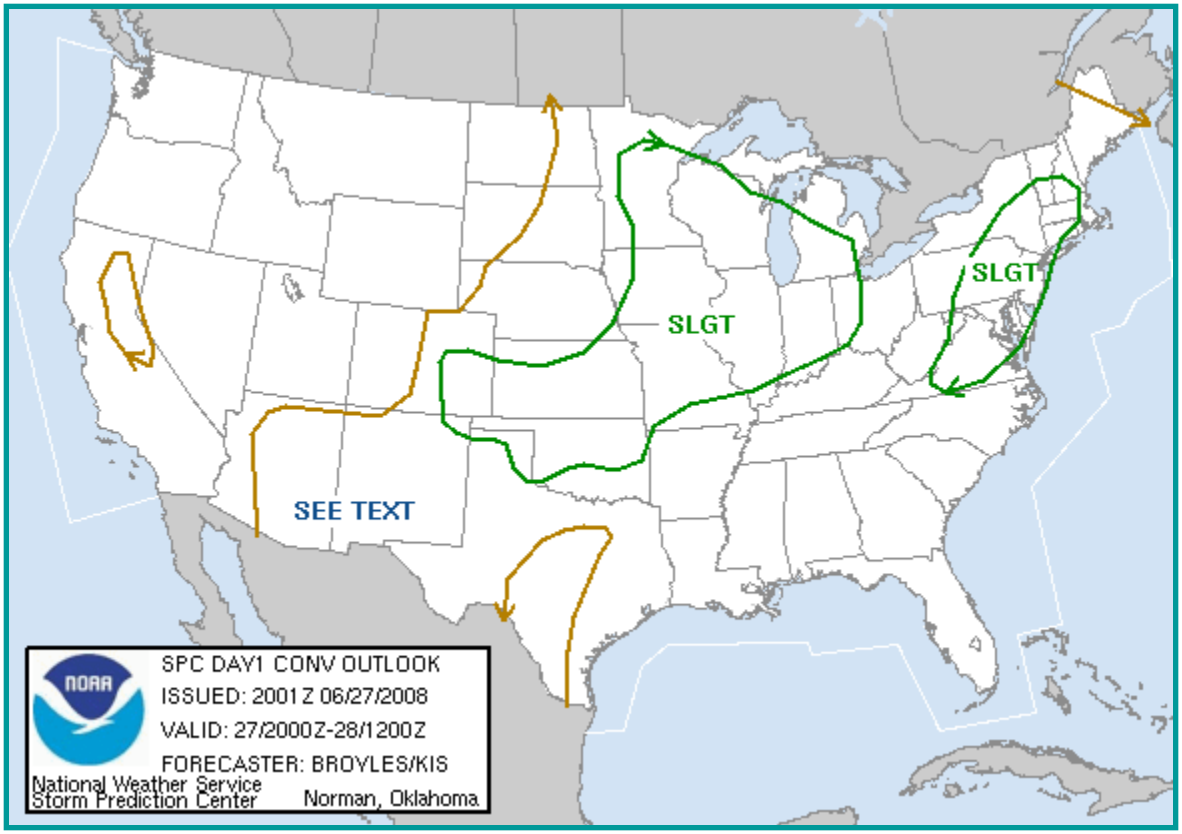
- RUC40 2000 UTC 27 June
- SBCAPE around 1500-2000 J/kg in eastern NE with little CIN
- Deep-layer bulk shear around 35+ kt
- Main synoptic front (pressure trough) southeast of Omaha metro



Surface-based CAPE (shaded), CIN (dashed), MSLP (blue contour), 0-6 km bulk shear (barbs)

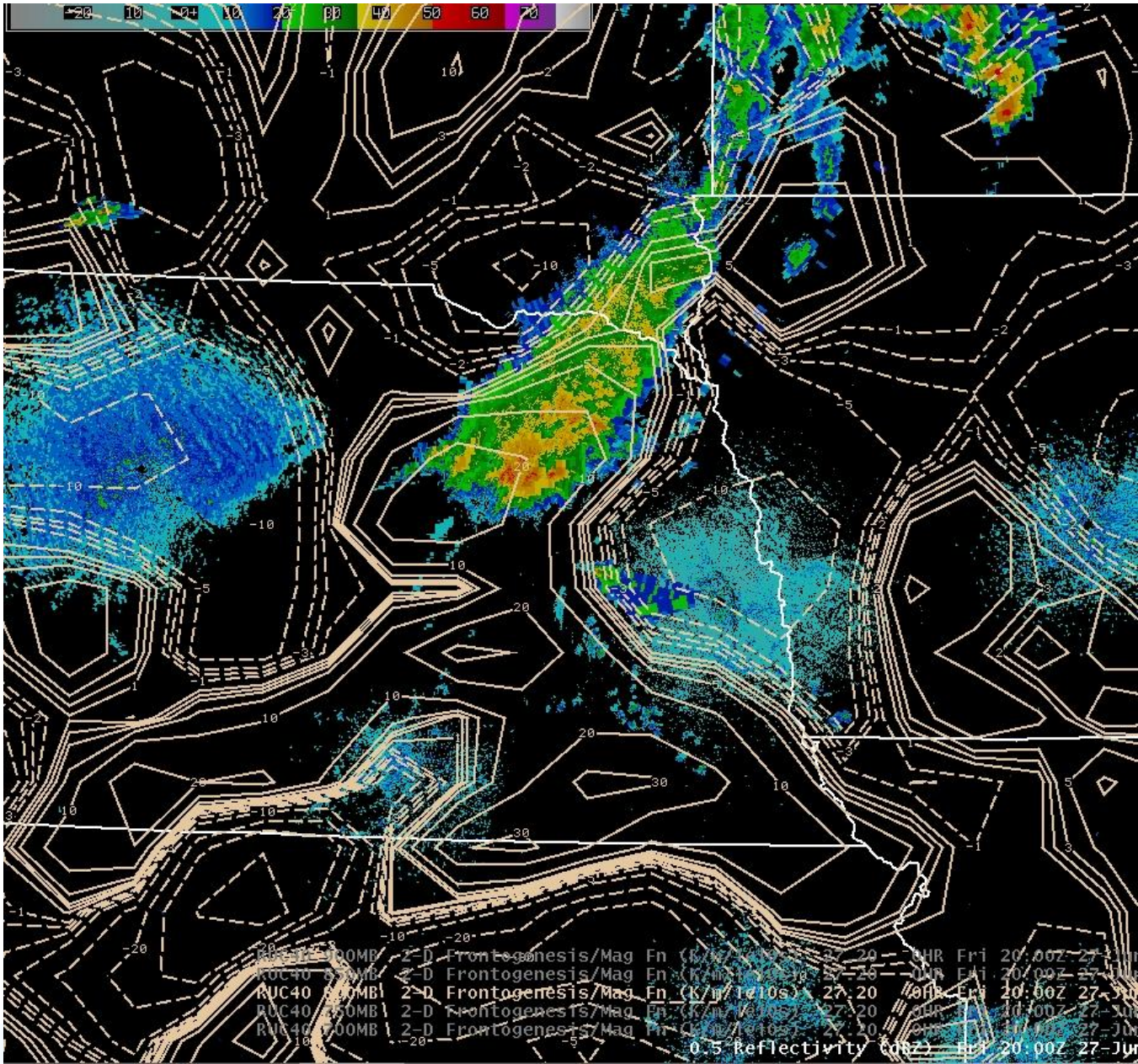
SPC SWODY1 Outlook:
2000 UTC 27 June

- Earlier SWODY1 outlooks and OAX HWO/forecast similar
- Omaha metro not included in SWODY1 outlooks (was mentioned in HWO as northwestern extent of risk area)



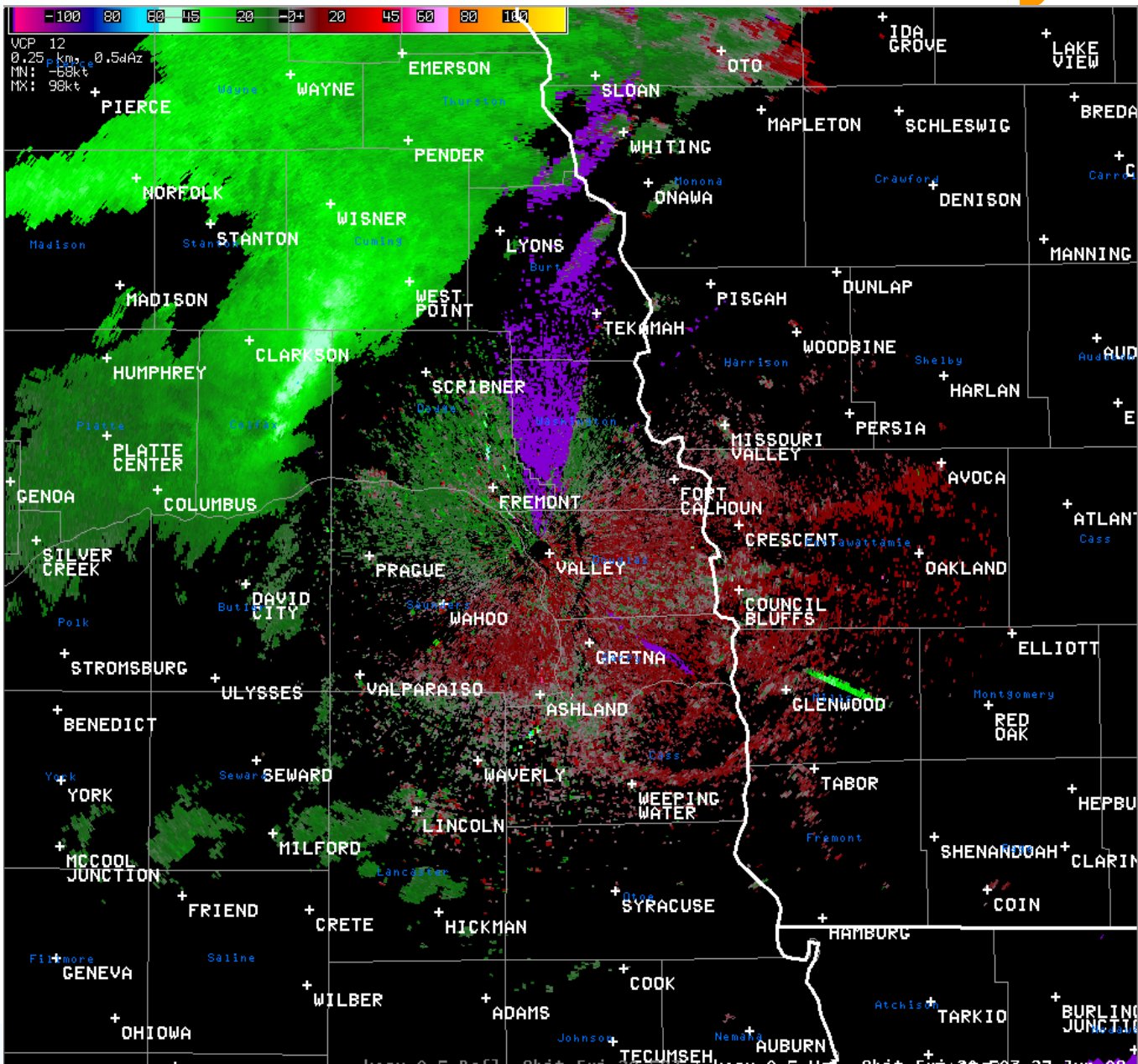
Convective Initiation

- RUC40 2000 UTC 27 June 800 mb frontogenesis
- Radar mosaic 2000 UTC 27 June
- Initial storms post-frontal and elevated



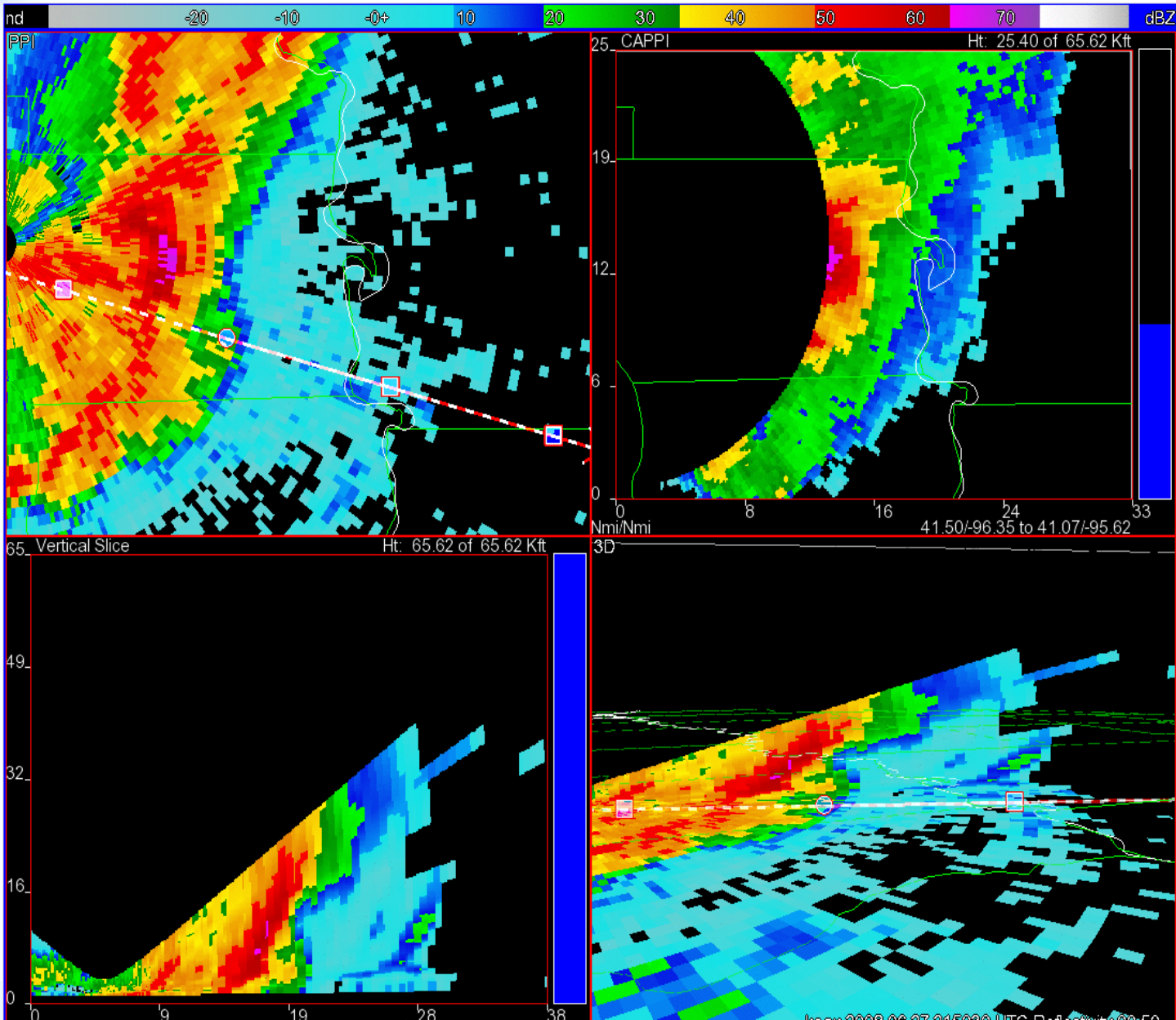
KOAX Radar Velocity

- Velocity loop for event
- Note:
  - Downburst (divergent) signatures
  - VERY strong winds near ground (over 100 kt at 200-300 ft AGL)



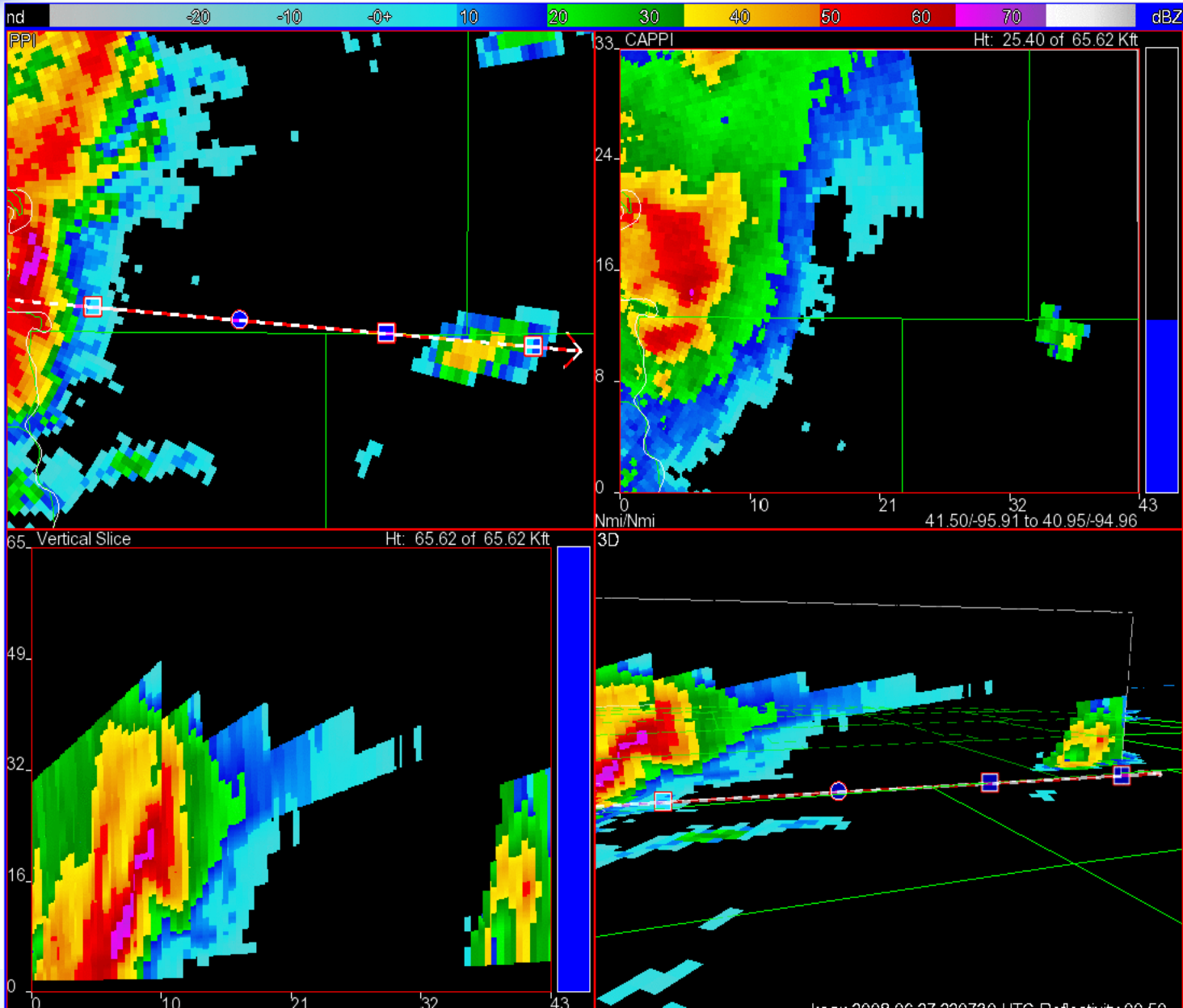
KOAX Radar Reflectivity

- KOAX FSI
- Loop in eastern Douglas county, NE, and western Pottawattamie county, IA (Omaha metro)
- Note
  - Pulsing and dropping cores
  - Bowing and arcing segments



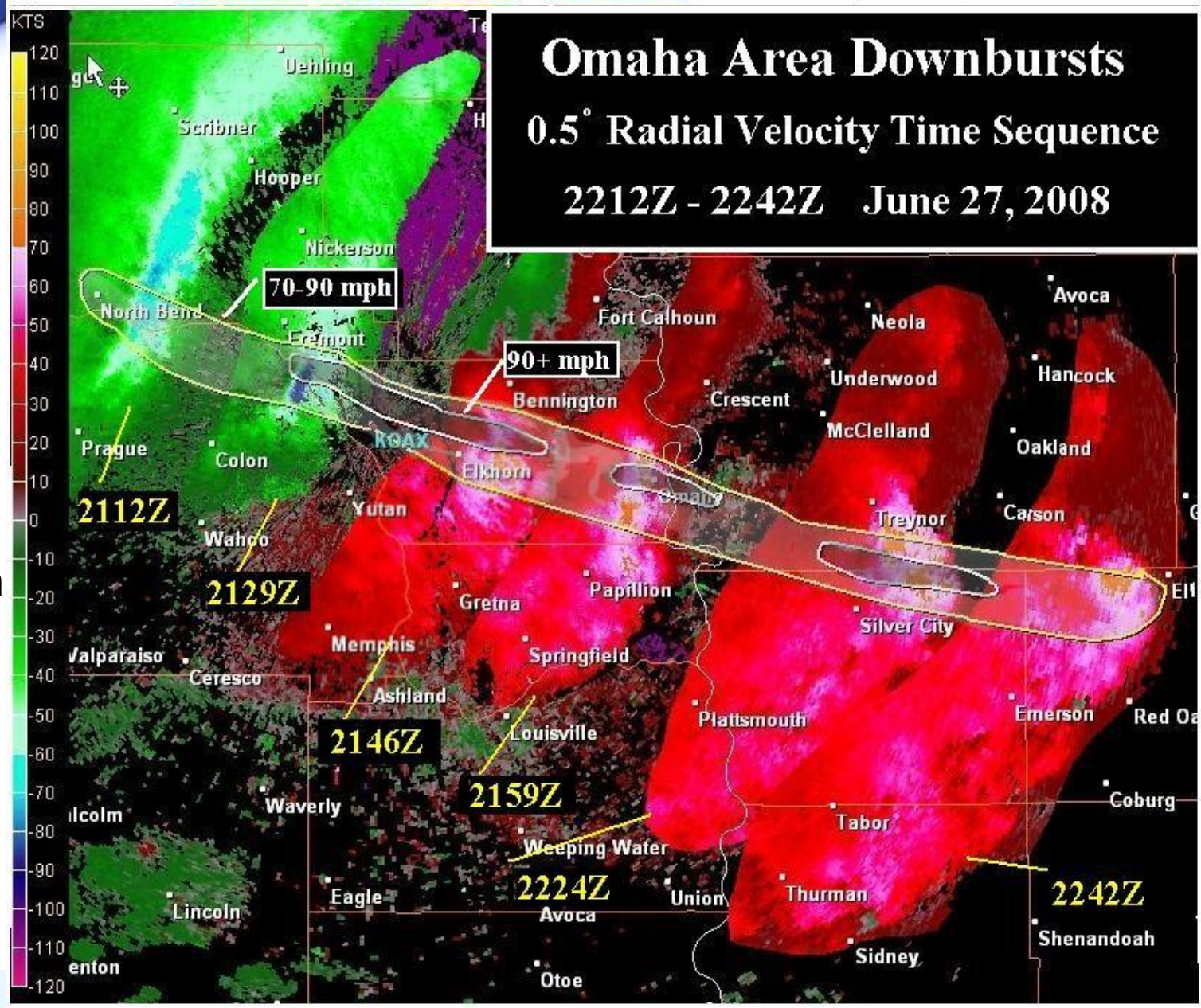
KOAX Radar Reflectivity

- KOAX FSI
- Loop in Pottawattamie/ Mills/ Montgomery counties, IA
- Note
  - Pulsing and dropping cores
  - Bowing and arcing segments

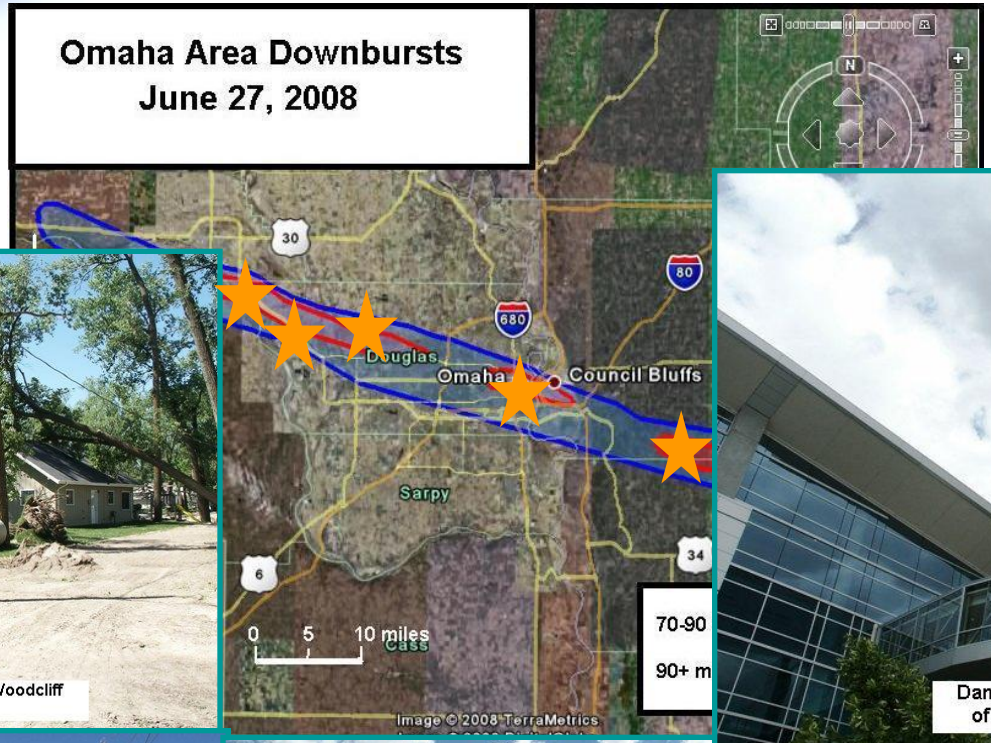


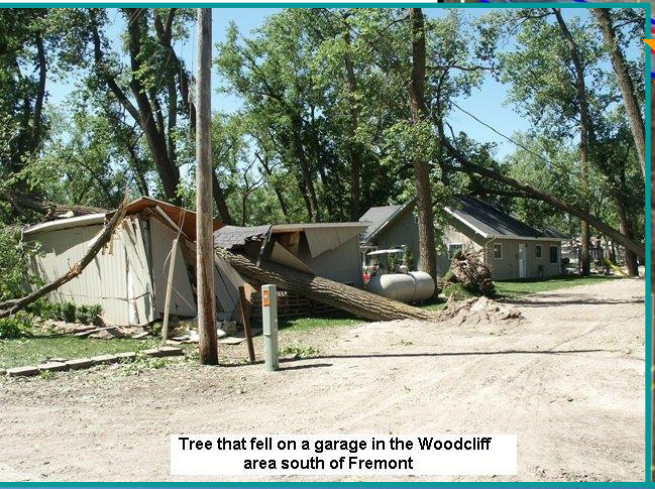
KOAX Radar

- Reflectivity and velocity composite images (via GRlevel2 Analyst)
- Wind swath overlaid (from damage survey)

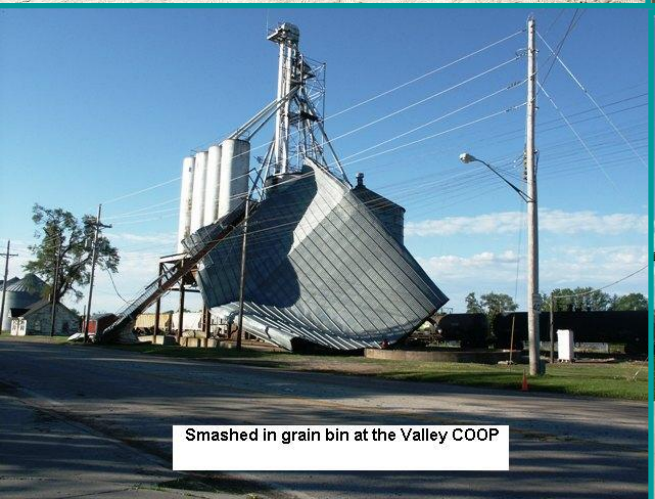


Damage Survey

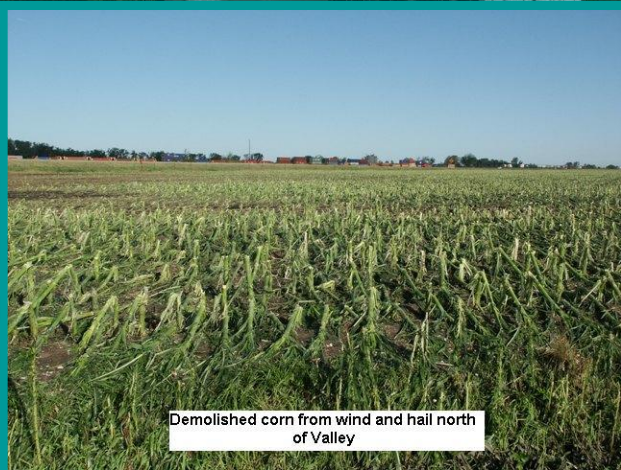



Tree that fell on a garage in the Woodcliff area south of Fremont


Damage to the northwest exterior of the Qwest Center in Omaha

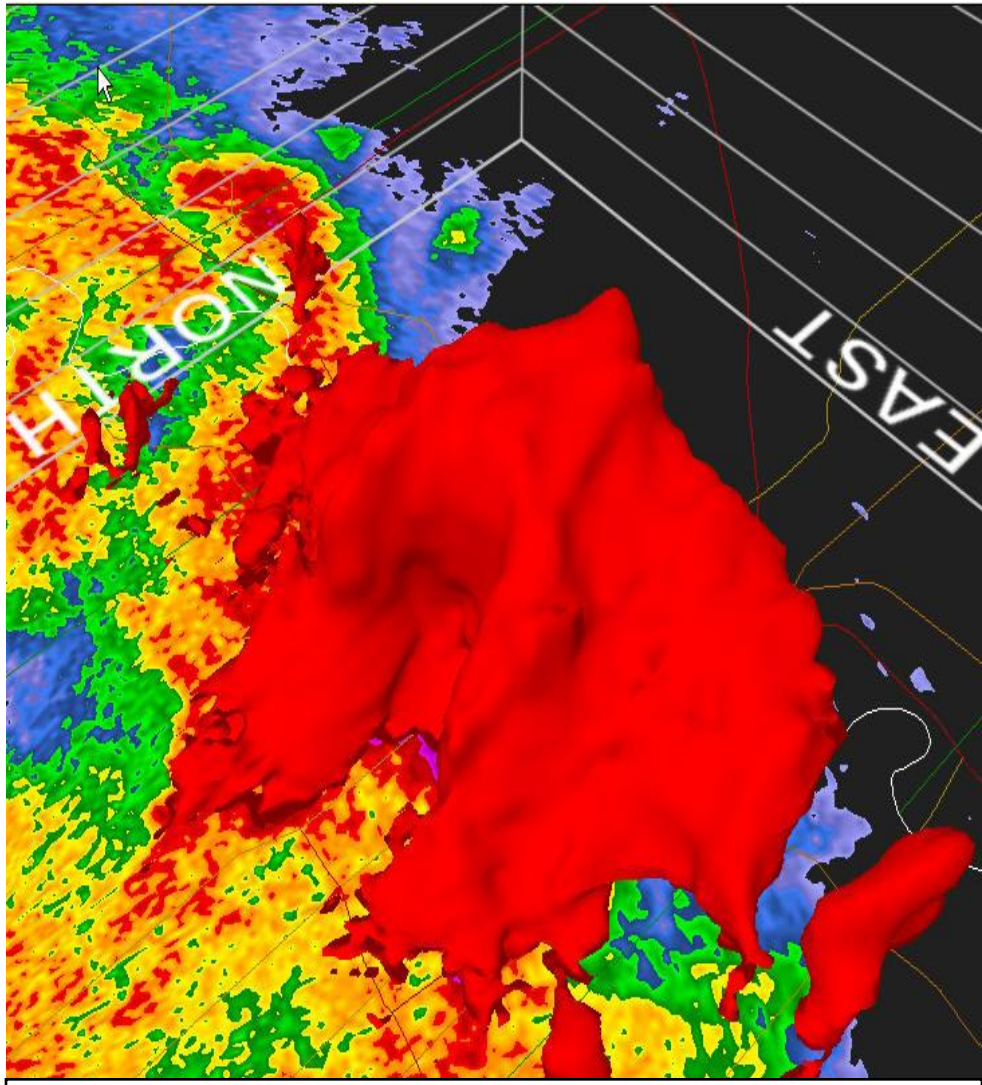

Smashed in grain bin at the Valley COOP


Damage to a home due to winds over 100 mph around 174th St. north of Maple


Demolished corn from wind and hail north of Valley

Summary

- Convective, non-tornadic wind event
  - Initial forcing: Mid-level (800-750 mb) frontogenesis
  - Became surface-based in more supportive environment
  - Large hail and excessive damaging wind reports
- High impact on Omaha metro area
  - One of a series of severe thunderstorms
  - Significant and widespread structural and tree damage
- Future work
  - Identify other favorable environmental parameters
  - Compare to other events (i.e. Pakwash 1991, Concordia 1992)



3-D KOAX Reflectivity at 2159 UTC (courtesy GR Level 2 Analyst)

This Case is Under Further Review!

Questions? Contact:

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